Although the invention has been described with respect to various embodiments, it should be realized this invention is also capable of a wide variety of further and other embodiments within the spirit and scope of the description. An entirely analog receiver circuit implementation is also possible. The various DSP implemented demodulation steps, narrow band filters and other systems can be translated into analog or digital circuit equivalents. Also, although lost fire fighters within a firefighting scenario are mainly described above, it should be realized that the system described herein may also be used to locate a wide variety of objects such as, for example, first responders or the like which are located in areas where the visibility is poor.

Other improvements could involve further application of the information about direction and distance as determined by the position and orientation of the wand. For example, a short range data transmitter could send the indicator signal from the wand back to the target being sought. A data receiver at the target could use this information to induce an additional circuit at the target to produce a burst of piercing sound, or an intense light when the searching was sufficiently near and pointing directly at the target. This would further enhance the ability to close in on the target rapidly in otherwise visually confusing situations.

Another embodiment may have a feature that allows the user of the search wand to suppress, by push button or some other control, the audio, visual or vibration alert when they choose. This would allow them to suppress sounds from the wand when they need to hear communication from their radio, speak to a nearby user or to listen for indications of proximity to the victim for which they are searching. Similarly, suppressing the lights or vibration may aid in using other visual search devices or feeling for vibrations in a building that may be signs of floor or wall collapse.

Although the invention has been described with respect to various embodiments, it should be realized this invention is also capable of a wide variety of further and other embodiments within the spirit and scope of the appended claims, such as, for example, with appropriate modification the present invention could be used for underwater sensing of missing objects such as swimmers or ships.

What is claimed is:

1. A method for locating a transmitter using a receiver, comprising the steps of:

transmitting at least three distinctive and mutually orthogonal signals from a transmitter, the at least three distinctive and mutually orthogonal signals having a frequency of most 200 kHz;

receiving, in a near field region, the transmitted at least three distinctive and mutually orthogonal signals at each one a pair of separated antennas; hereinafter referred to as the at least three distinctive and mutually orthogonal signals received at said each one of the pair of separated antennas; each one of the pair of separated antennas being located at separate ends of a linear structure; the linear structure being configured to be handheld;

demodulating the at least three distinctive and mutually orthogonal signals received at said each one of the pair of separated antennas; producing at least three demodulated signals corresponding to said each one of the pair of separated antennas;

obtaining, after demodulating, for said each one of the pair of separated antennas, from the at least three demodulated signals corresponding to said each one of the pair of separated antennas, a transmitting antenna orientation invariant signal corresponding to said each one of the pair of separated antennas;

determining a direction to the transmitter from the transmitting antenna orientation invariant signal obtained for said each one of the pair of separated antennas; and

providing an indicator signal indicating proximity and distance to the transmitter;

whereby the method enables rescue of a first responder in almost any type of building including fully metallic buildings.

2. The method of claim **1**, wherein the step of obtaining includes combining, for said each one of the pair of separated antennas, signal amplitude levels of the at least three demodulated signals corresponding to said each one of the pair of separated antennas; thereby obtaining for a combined signal amplitude level corresponding to said each one of the pair of separated antennas.

3. The method of claim **2**, further comprising indicating to a user a difference between the combined signal amplitude level corresponding to one of the pair of separated antennas and the combined signal amplitude level corresponding to another one of the pair of separated antennas.

4. The method of claim **2**, wherein the noise is received at said each one of the pair of separated antennas; and, wherein the step of determining includes using received noise levels for adjusting the combined signal amplitude levels.

5. The method of claim **2**, wherein the step of determining includes aligning the pair of antennas to maximize the difference between the combined signal amplitude levels of the pair of antennas to estimate a direction to the transmitter.

6. The method of claim **4**, further comprising the step of estimating a distance to the transmitter from the receiver from the difference in the combined signal amplitude levels.

7. The method of claim **1**, wherein the step of transmitting uses three orthogonally polarized signals.

8. The method of claim **6**, wherein the step of transmitting uses three magnetic dipole antennas or three electrical dipole antennas.

9. The method of claim **1**, wherein the step of transmitting includes varying the distinctive signals by different frequencies, by time division multiplexing or by code division multiplexing.

10. The method of claim **9**, wherein the step of varying the distinctive signals includes sufficient distinction to enable differentiation between a plurality of transmitters in the step of receiving.

11. The method of claim **1**, wherein the step of receiving uses gain control circuits for receiving the transmitted signals.

12. The method of claim **11**, wherein the step of determining uses algorithmic compensation for processing near-field portions of the transmitted signals.

13. The method of claim **1**, wherein the step of transmitting is activated by a predetermined period of non-movement of the transmitter.

14. The method of claim **1** wherein the transmitter is located with respect to an object to be located and where the receiver is located with respect to the user.

15. The method of claim **14** wherein the object is a firefighter.

16. A system for determining the location of a transmitter using a receiver, comprising:

a transmitter adapted for orthogonally transmitting at least three distinctive signals; the at least three distinctive signals having a frequency of most 200 kHz;